

2023 Rule Revision Overview and Notes

Rules for vehicle production, vehicle inspection, examination (static and dynamic) comply with Formula SAE Rules.

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About NG indication

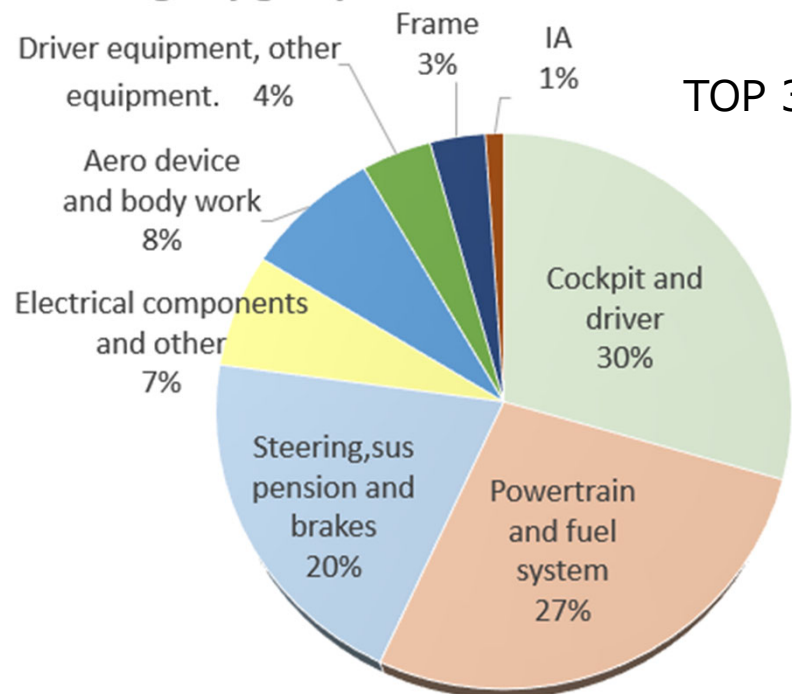
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1. Percentage pointed out by group

The top three groups' comments accounted for 3/4 of the total.
Please pay special attention to the rules that were pointed out so many times in order to ensure a smooth passing of the vehicle inspection at the 2023 congress.

Percentage by groups



TOP 3 group

BIG group	Cases	%
Cockpit and driver	138	28
Powertrain and fuel system	128	26
Steering,suspension and brakes	95	20
Electrical components and other	31	10
Aero device and body work	37	8
Driver equipment, other equipment.	19	4
Frame	15	3
IA	5	1
NG ALL	468	100

2. Number of NGs in Top Points

Indication contents	Total	Group
Firewall equipment failure	18	Cockpit
Brake line interference	15	Brake
Driver protection failure	14	Cockpit
Cockpit section template impasses	12	Cockpit
Set belt angle failure	12	Driver seat
Fuel line interference	11	Fuel system
Cowl R38 rule nonconformity	10	Body work
Fixed roll bar pad failure	10	Cockpit
Brake system positive lock failure	9	Brake
Brake line imperfections	9	Brake
Belt interference with seat	9	Driver seat
Adjustment failure of throttle pedal stopper	9	Powertrain
Suspension system tightening failure	8	Suspension
Brake non-lighting	8	Brake
Component intrusion within 25mm behind AIP	7	Frame
NG suspension strokes	7	Suspension
Positive lock failure in intake system components	7	Powertrain
Fuel spill prevention flaws	7	Fuel system
Defective catch tank fastening	7	Fuel system
Positive lock failure in steering system	6	Steering

In this article,
we introduce more than 10
of the most popular.

3. Regarding more than 10 indications

Firewall equipment failure 18 cases

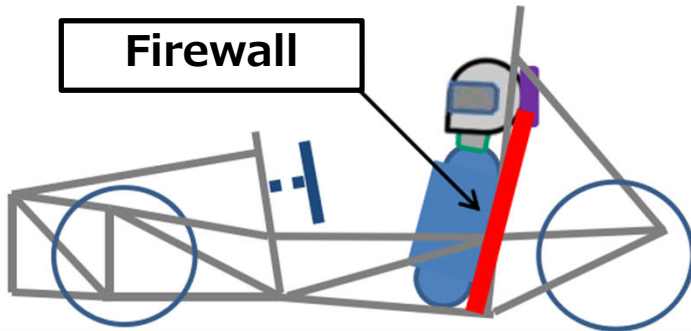
T1.8 Important regulations

- Be a non permeable surface made from a rigid, Nonflammable Material
 - Seal completely against the passage of fluids (the Firewall itself, edges, and Floor Closeout)
 - The Firewall must extend sufficiently far upwards and/or rearwards and/or sideways where any point on the drivers body less than 100 mm above the bottom of the helmet of the tallest driver must not be in direct line of sight with any part.
 - Firewalls composed of multiple panels must overlap and be sealed at the joints
- Sealing between firewalls must not be a stressed part of the Firewall
- Grommets must be used to seal any pass through for wiring, cables, etc

To protect the driver from all heat sources, we recommend a thickness of at least 0.7 mm for aluminum and 0.5 mm for iron plates.

Not seeing from the driver's perspective.

Firewall



Please use a grommet to pass the harness.



Brake line interference 15cases / Fuel line interference 11cases

Pointed out	Number of cases	Item
Firewall equipment failure	18	Cockpit
Brake line interference	15	Brake
Driver protection failure	14	Cockpit
Cockpit section template impasses	12	Cockpit
Set belt angle failure	12	Driver seat
Fuel line interference	11	fuel system
Cowl R38 rule nonconformity	10	body work
Fixed roll bar pad failure	10	Cockpit
Brake system positive lock failure	9	Brake
Failure to fix brake line	9	Brake
Belt interference with seat	9	Driver seat
Adjustment failure of throttle pedal stopper	9	Powertrain
Suspension system tightening failure	8	Suspension
Brake non-lighting	8	Brake
Component intrusion within 25mm behind AIP	7	Frame
Suspension strokes NG	7	Suspension
Positive lock failure in intake system components	7	Powertrain
Fuel spill prevention flaws	7	fuel system
Defective catch tank fastening	7	fuel system
Positive lock failure in steering system	6	Steering

Notice

Fix brake/fuel lines so they do not interfere with other parts and wear out.

Prevent interference mainly with metal.

Driver protection failure 14cases

Pointed out	Number of cases	Item
Firewall equipment failure	18	Cockpit
Brake line interference	15	Brake
Driver protection failure	14	Cockpit

Notice

T.1.3 Driver Protection

T.1.3.1 The driver's feet and legs must be completely contained inside the Major Structure of the Chassis.

T.1.3.2 While the driver's feet are touching the pedals, in side and front views, any part of the driver's feet or legs must not extend above or outside of the Major Structure of the Chassis.

T.1.3.3 All moving suspension and steering components and other sharp edges inside the cockpit between the Front Hoop and a vertical plane 100 mm rearward of the pedals must be covered by a shield made of a solid material. Moving components include, but are not limited to springs, shock absorbers, rocker arms, antiroll/sway bars, steering racks and steering column CV joints.

T.1.3.4 Covers over suspension and steering components must be removable to allow inspection of the mounting points.

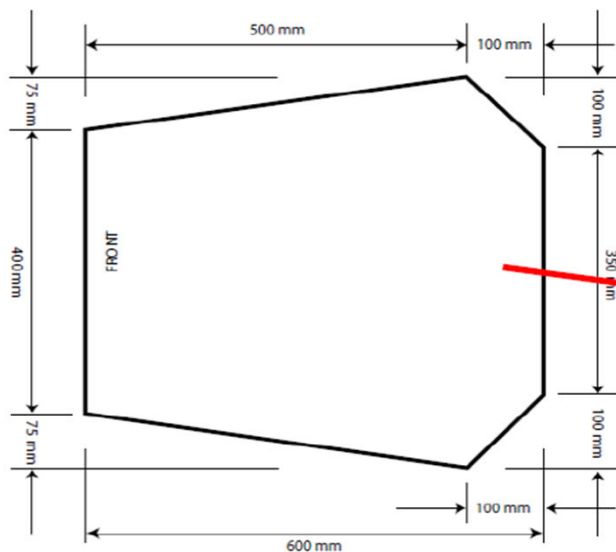
All edges, including those in the cockpit, must be treated to ensure safety. (especially where drivers touch)

Cockpit section template impasses 12cases

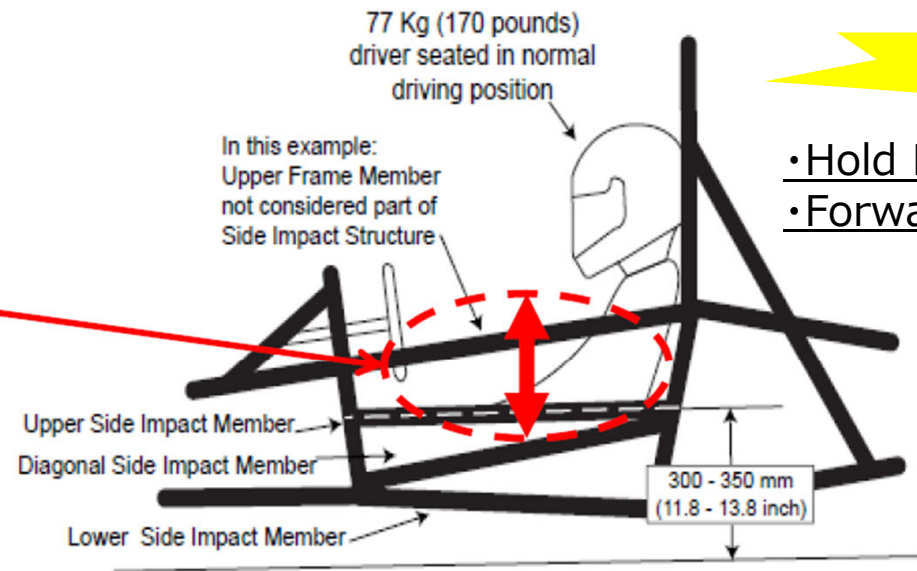
Pointed out	Number of cases	Item
Firewall equipment failure	18	Cockpit
Brake line interference	15	Brake
Driver protection failure	14	Cockpit
Cockpit section template impasses	12	Cockpit
Set belt angle failure	12	Driver seat
Fuel line interference	11	fuel system

Frame : Move it past under the upper SIS

Monocock : Move to the top of the lowest end of the cockpit or 320mm (2023 New: T.1.1.2 b)



T.1.1 FIG



How to take down template

- Hold Horizontal (Diagonal NG)
- Forward/backward movement OK

The design should allow for an immediate escape by the driver in the event of an emergency, such as a fire.

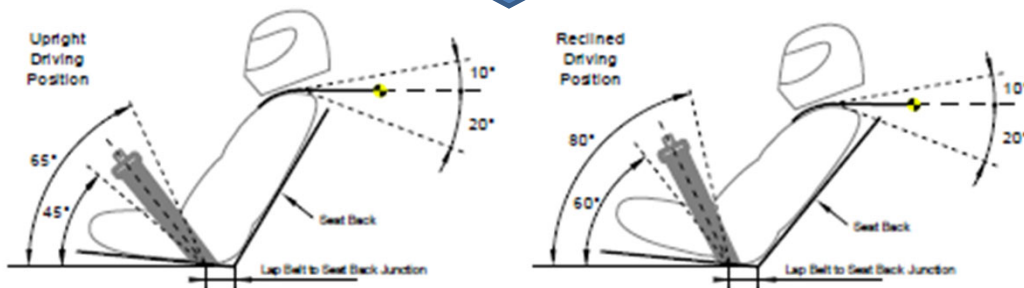
Set belt angle failure 12cases

Lap belt mount: T. 2.5

•It is 45 -65 degrees to the horizontal in upright position and 60 -80 degrees in recline position.

Shoulder harness mount: T. 2.6

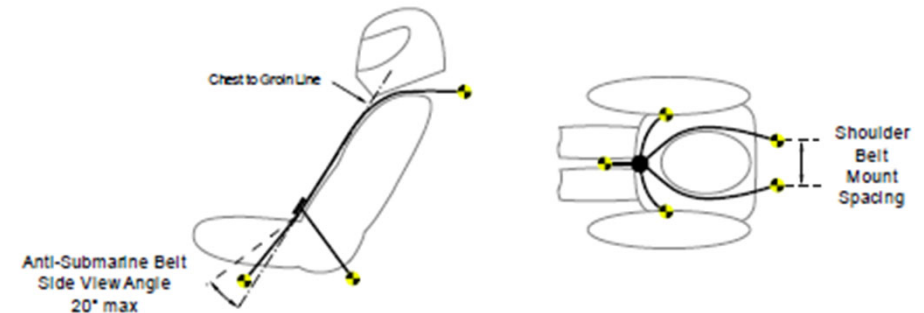
•The angle from the shoulder must be within 10 degrees above and 20 degrees below the horizontal.



Anti-Submarine Belt: T. 2.7

•In the case of the five-point system, on a straight line extending from the shoulder belt or slightly forward.

•In the case of the six-point type, directly under the lead from the buckle or slightly behind.



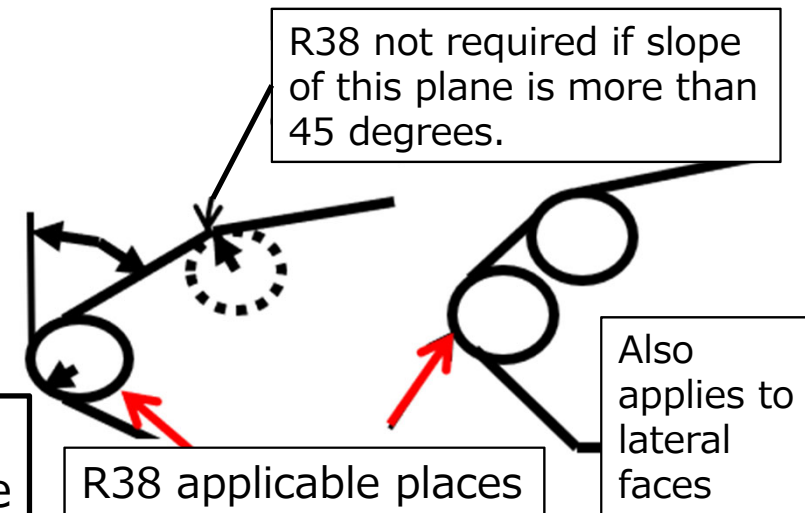
Anti-Submarine Belt: T. 2.7

•In the case of the six-point type, directly under the lead from the buckle or slightly behind.



Cowl R38 rule nonconformity 10cases

Pointed out	Number of cases	Item
Firewall equipment failure	18	Cockpit
Brake line interference	15	Brake
Driver protection failure	14	Cockpit
Cockpit section template impasses	12	Cockpit
Set belt angle failure	12	Driver seat
Fuel line interference	11	fuel system
Cowl R38 rule nonconformity	10	body work
Fixed roll bar pad failure	10	Cockpit



Body Work Nose Tip: T. 7.2

•The nose tip of the cowl has a radius of 38 mm or more and is applied in all directions of 45 degrees.

This minimum radius is applied along the upper, lateral and lower sides of all projections affecting at least 45 degrees to the forward direction.

Fixed roll bar pad failure 10cases

Pointed out	Number of cases	Item
Firewall equipment failure	18	Cockpit
Brake line interference	15	Brake
Driver protection failure	14	Cockpit
Cockpit section template impasses	12	Cockpit
Set belt angle failure	12	Driver seat
Fuel line interference	11	fuel system
Cowl R38 rule nonconformity	10	body work
Fixed roll bar pad failure	10	Cockpit
Brake system positive lock failure	9	Brake

Notice

Roll bar pad: T. 2.9

Required for any bar the helmet may come into contact with.

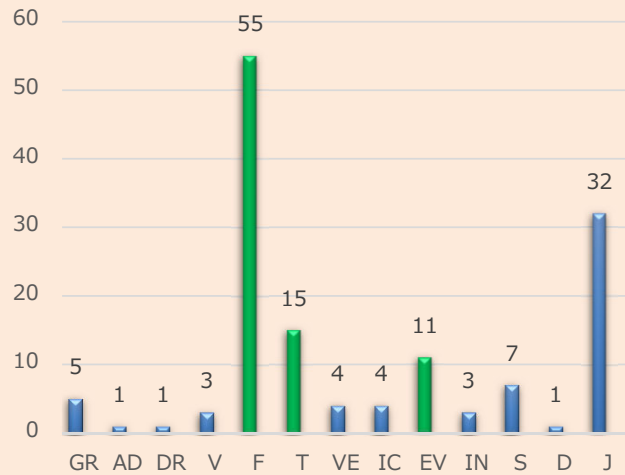
Secure the helmet firmly so it does not rotate from the contact side.

Analysis of **2022 official Q&A** (items with many inquiries)

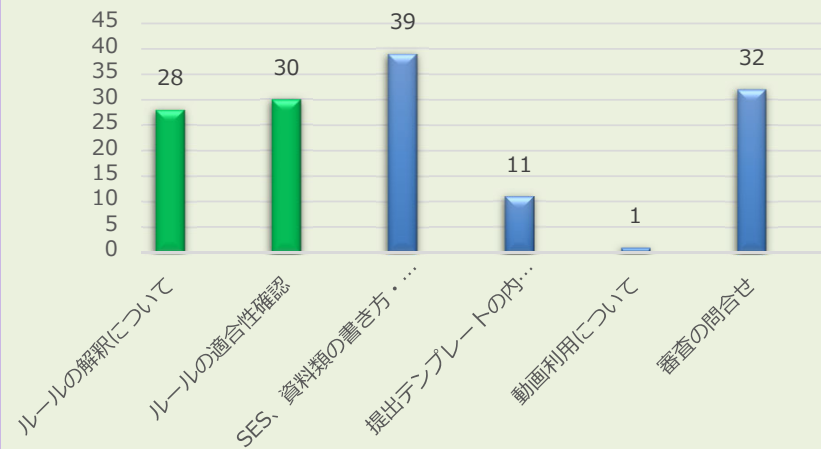
2022 Q&A trends (number of cases comparison)



Number of inquiries by Q&A rule item

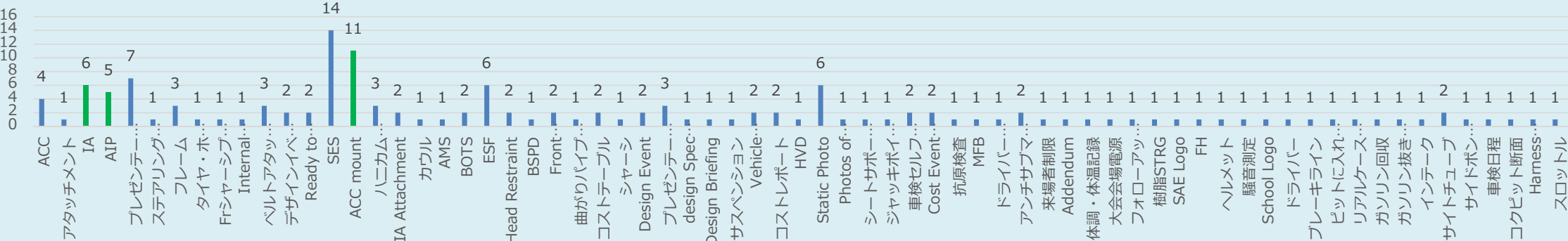


By subject of inquiry



- There are many inquiries about F and T
- Questions about rule interpretation and conformance
- Many inquiries about IA, AIP, and ACC
- ※ The contents of ACC had many questions about its SES

Distribution by Q&A target



2022 Q&A trends (number of cases comparison)



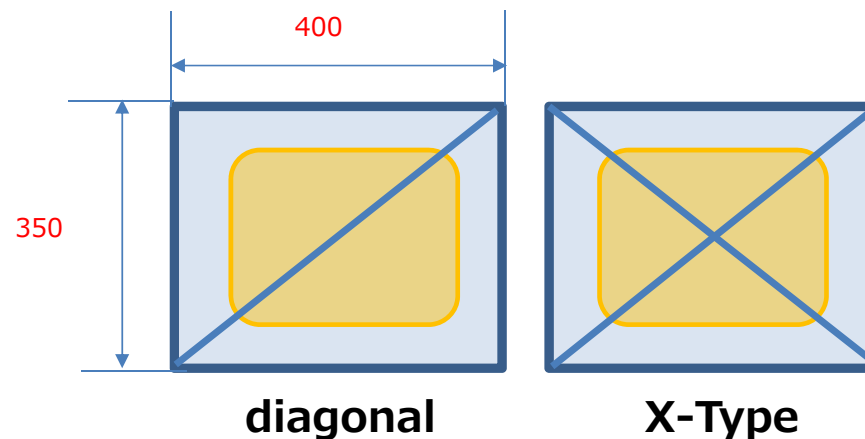
● Main inquiries from IA, AIP

Target parts/parts	2022 Summary of questions from the team
IA	What is the judgment when sharpening STD form IA?
	Is it possible to use a custom product with an opening on the front of the IA?
	Is it OK for the IA to have a hole in the bonding surface?
AIP	
	There are eight M8 bolt holes on the AIP, but is this, OK?
	How to attach AIP
	Is it possible to repair and close the hole in the AIP? Also, is there any specification for fixing the repair material to the AIP?

F.8.4.3a IA

FBH dimensions in standard IA and necessity of brace

- For standard IA (form)
 - If the FBH external dimensions are 400 x 350 mm or more, a brace is required
- For standard IA (honeycomb)
 - Regardless of FBH dimensions, he always needs a brace (F.3.2.1.b compatible tube)



2022 Q&A trends

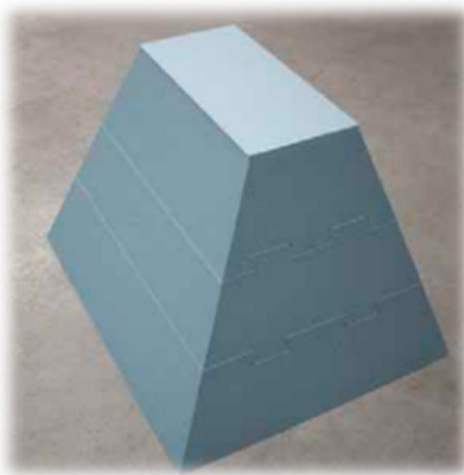


F.8.4 IA (Standard form impact attenuator)

If you cut or process the standard form IA, it will be treated as a custom product.

*From 2022, "standard form IA" will only be allowed **to be attached by bonding**,
Perforations such as bolt mounting holes are not permitted

* Excessive scratches, dents, scrapes, etc. will also be pointed out.



- Hole drilling for bolt fastening in the past
- Excessive scratches and dents
- Reinforcement work by sticking tape



These states are considered processed. NG judgment in 2023

*At the time of the tournament, tapes affixed to prevent scratches etc. "By removing it, it is considered unprocessed." (be careful)

2022 Q&A trends

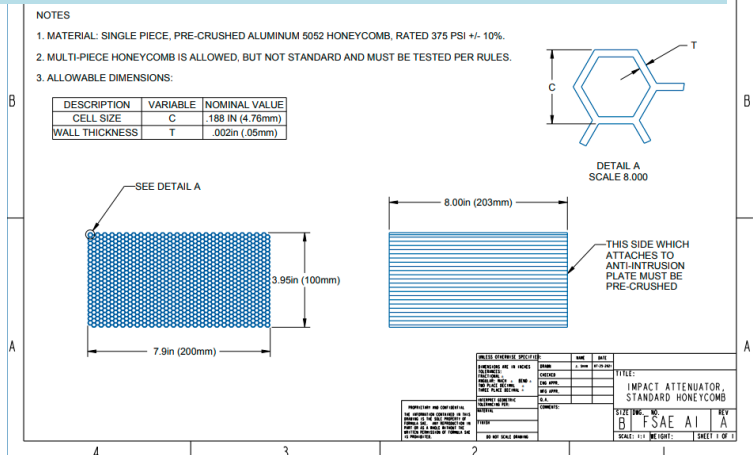


F.8.4 IA (Standard honeycomb impact attenuator)

Definition of standard honeycomb IA (quoted from 2022 Formula SAE Japan Official Announcement No.3)

- If the honeycomb material satisfies the specifications specified by SAE international, Can be used as a standard honeycomb impact attenuator
- There is no manufacturer designation for honeycomb materials. You can obtain it from any distributor as long as you can prove that it meets the specified conditions. Many manufacturers, such as Plascore, Texas, Almet, and Hexcel, manufacture suitable honeycomb materials.

SAE STD honeycomb IA drawing



1. Material: single piece,
Pre-crushed aluminum 5052 honeycomb, Rated at 375 PSI +/- 10%
2. Multi-piece honeycombs are allowed but not standard and It is necessary to test according to the rules.
3. Allowable dimensions
Cell size C .188 inch (4.76mm)
Wall Thickness T .002in (.05mm)

2022 Q&A trends



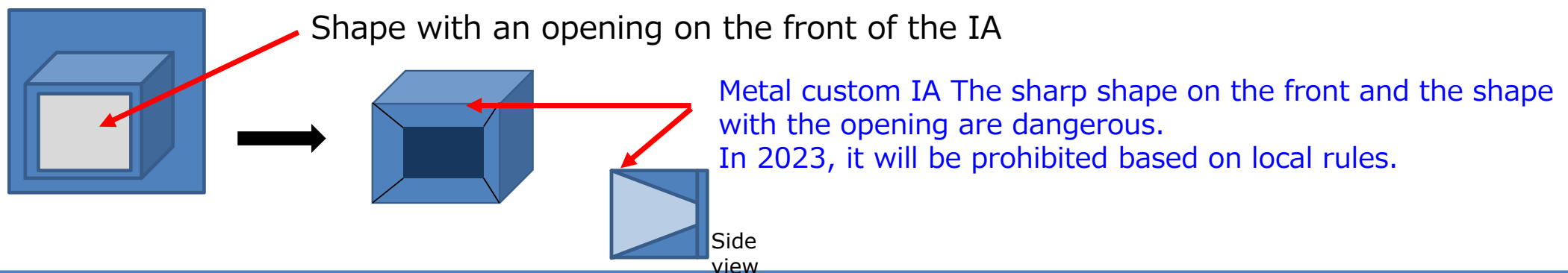
F.8.4 IA (Custom impact attenuator)

Is it possible to use even if the front part of the IA has an opening shape? (Official question for 2022)

*Official answer for 2022 Original text

- As your team has interpreted, even if the front of the IA is open, there is no problem with the rules. However, in consideration of safety, it is recommended to change the design without openings if possible. From the next fiscal year onwards, we plan to add a local rule prohibiting front openings.

(Front opening IA was officially prohibited by Local Rule J2023-1-04 issued on December 20, 2023.)



Summary of 2023Rules Part. F Changes

Based on Rules 2023 version 2.0 (7.Nov.2022)

2023 Rules Revision



F.3.5.3a Aluminum Tubing

a. Minimum Wall Thickness for Aluminum Tubing:	Non-Welded	2.0 mm
	Welded	3.0 mm

2023

Non-Welded 2.0mm added

F.4.3.1 Laminate Test

Testing Requirements

- a. Any tested samples must be engraved with the construction date, sample name, and peak test force.
- b. The same set of test results must not be used for different monocoques in different years.

The intent is for the test panel to use the same material batch, material age, material storage, and student layup quality as the monocoque.

2023

Since the quality of Laminate made by students varies greatly from year to year, it is necessary to test the Laminate of the current year.

2023 Rules Revision



F.5.1.2 Chassis Requirements are specified

Any chassis design that combines the Tube Frame, Monocoque, tubing and/or composite types must:

- a. Meet all relevant requirements F.5.1.1
- b. Demonstrate Equivalence F.2.3, as applicable
- c. Any connections must meet F.5.4, F.5.5, F.7.8 as applicable, or Equivalent.

2023

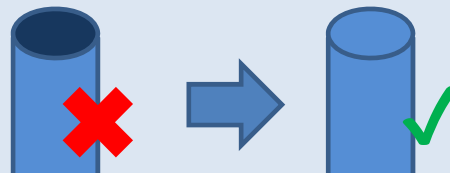
Rule numbers are specified

F.5.3.3 Tube Closing

Regulated tubing other than the open lower ends of Roll Hoops must have any open ends closed by a welded cap or inserted metal plug.

2023

**Ends of Tube used in Primary Structure MUST be Closed
(Except lower ends of Roll Hoops)**



2023 Rules Revision

F.5.6.2 Support tubing for Roll Hoop bends Required

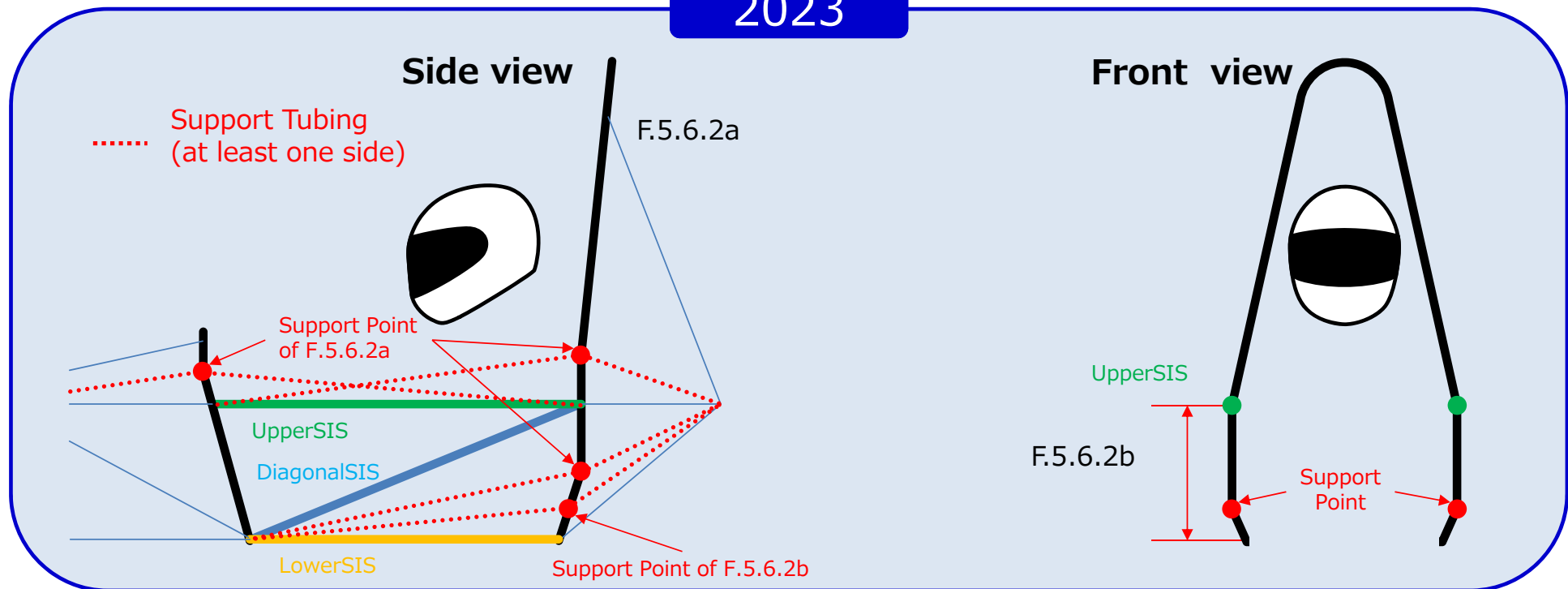
The Main Hoop and Front Hoop must be Triangulated into the Primary Structure with structural tubing.

The Triangulation must be at a node in side view for:

- Bends in side view
- Bends in front view below the Upper Side Impact Structure F.6.4, F.7.5

Also applicable to monocoque !

2023



2023 Rules Revision

F.5.14 Steering Protection Required

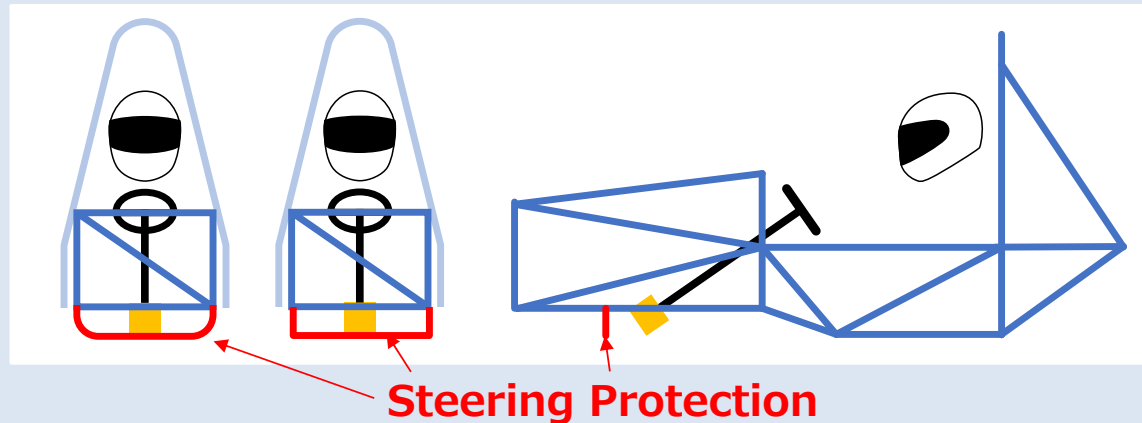
Steering system racks or mounting components that are external (vertically above or below) to the Primary Structure must be protected from frontal impact. The protective structure must:

- a. Meet F.3.2.1.n or Equivalent
- b. Extend to the vertical limit of the steering component(s)
- c. Extend to the local width of the chassis

2023

If Steering System's Rack & Pinion or Mounts locates out of Primary Structure vertically, Protection from frontal impact is required

Vertical : Height of Steering Components
Horizontal : local width of the chassis



2023 Rules Revision

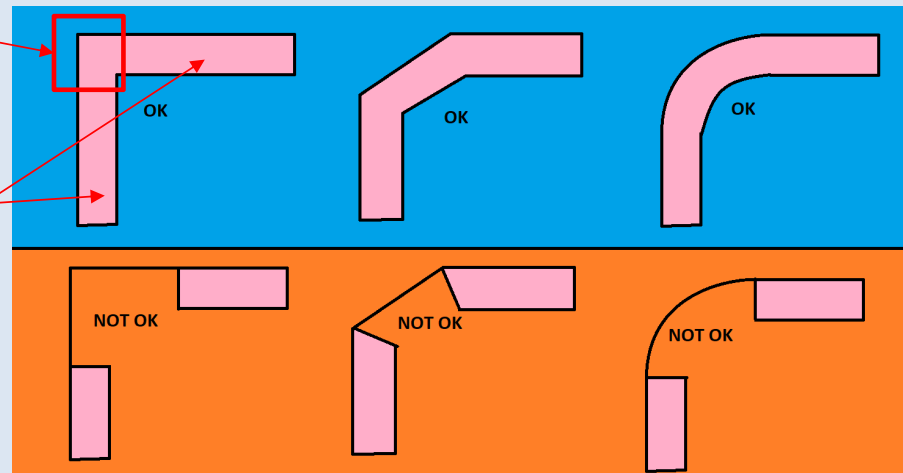
F.7.1.3 Laminate Core of Corner

Corners between panels used for structural equivalence must contain core

2023

Corner between panels
used for structural
equivalence

Structural Panel



Fill the corners with core

2023 Rules Revision

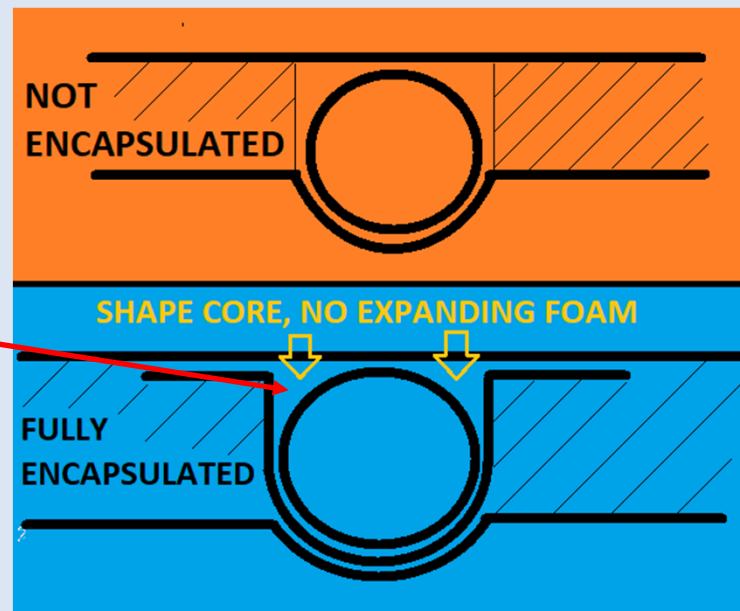
F.7.4.3a Laminated F.HoopFull

The Front Hoop may be fully laminated into the monocoque if:

- The Front Hoop has core fit tightly around its entire circumference. Expanding foam is not permitted.
- Equivalence to six or more mounts compliant with F.7.8 must be shown in the SES.

2023

Cover the entire circumference of the F.hoop with the core material without gaps. Do not use fillers such as Expanding urethane foam



2023 Rules Revision

F.7.6.1 Main Hoop Attachment Updated

The Main Hoop must be mechanically attached to the monocoque

- Main Hoop mounting plates must be 2.0 mm minimum thickness steel
- The Main Hoop tube must be mechanically connected to the mounting plate with 2.0 mm minimum thickness steel plates parallel to both sides of the tube, with gussets from the Main Hoop tube along both sides of the mounting plate

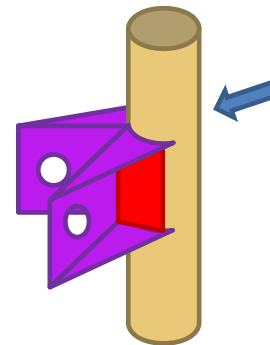
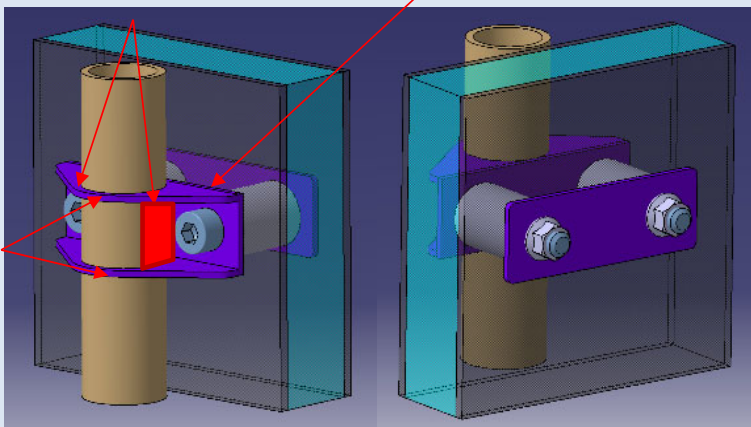
2023

Requirement of M.Hoop Attachment Updated

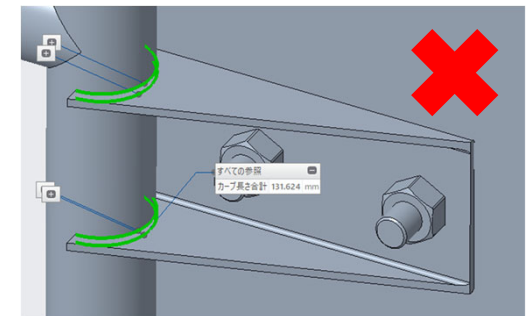
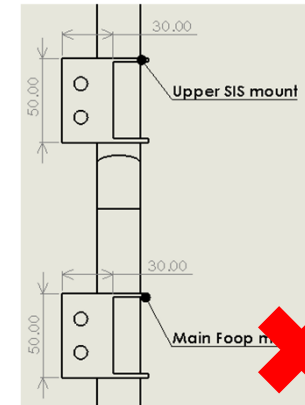
Steel plate
parallel to both
sides of tube

Mounting Plate

Gussets
(both sides of plate)



This shape
matches the rules



Only one side mounts don't
match the rules.

(Parallel Plate must be both side of tube)

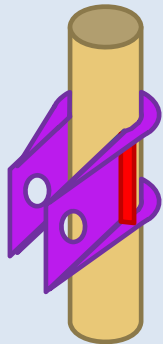
2023 Rules Revision

F.7.8.2 Semi-Monocoque

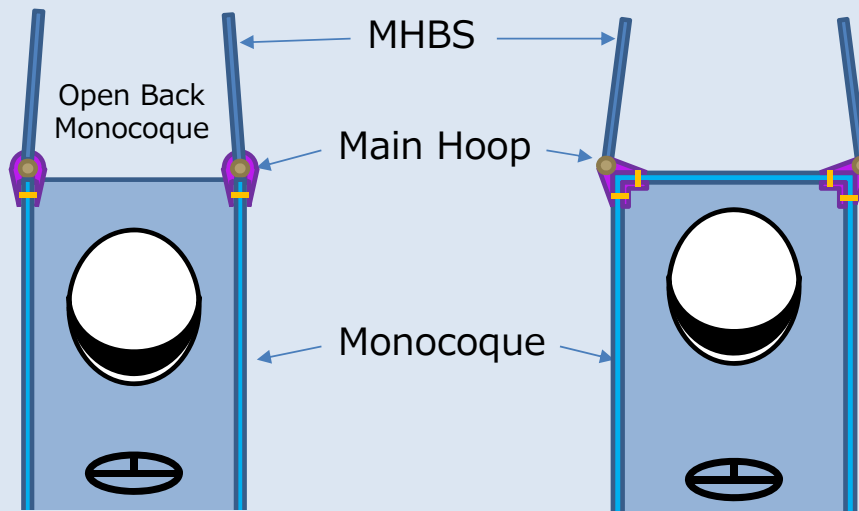
If a tube frame (F.6, F.11.2) meets the monocoque at the Attachments, the connection must obey one of the two:

- Parallel brackets attached to the two sides of the Main Hoop and the two sides of the Side Impact Structure
- Two mostly perpendicular brackets attached to the Main Hoop and the side and back of the monocoque

2023

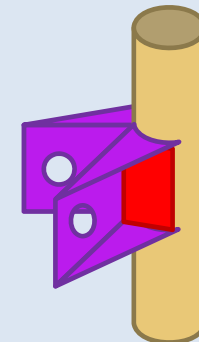


Parallel brackets attached to the two sides of the Main Hoop and the two sides of the Side Impact Structure



F.7.8.2 a

F.7.8.2 b



Two mostly perpendicular brackets attached to the Main Hoop and the side and back of the monocoque.

Only F.7.8.2a or b is allowed

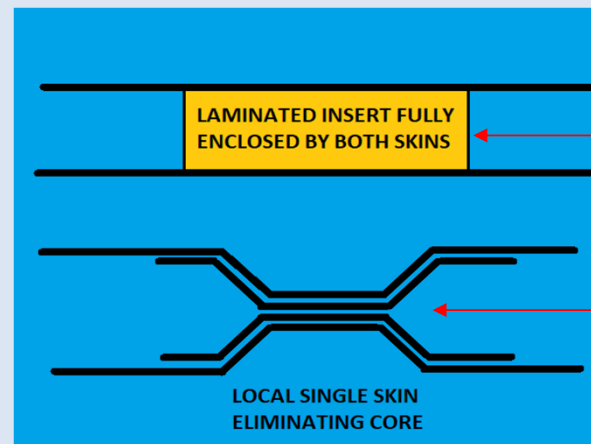
2023 Rules Revision

F.7.8.8 Monocoque Attachment Point

Each attachment point must contain one of the two:

- a. A solid insert that is fully enclosed by both the inner and outer skin.
- b. Local elimination of any gap between inner and outer skin, with or without repeating skin layups.

2023



F.7.8.8a

F.7.8.8b

Only F.7.8.8a or b is allowed

Single Skin Mount is prohibited

2023 Rules Revision

F.7.9.2b&c Driver Harness Attachment Test Load Direction

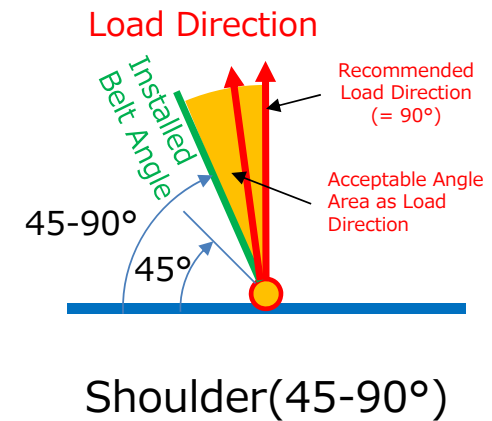
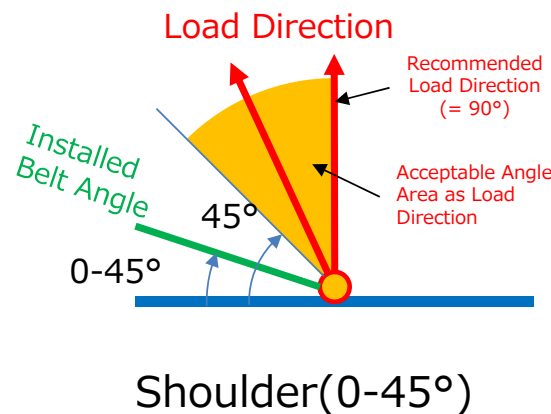
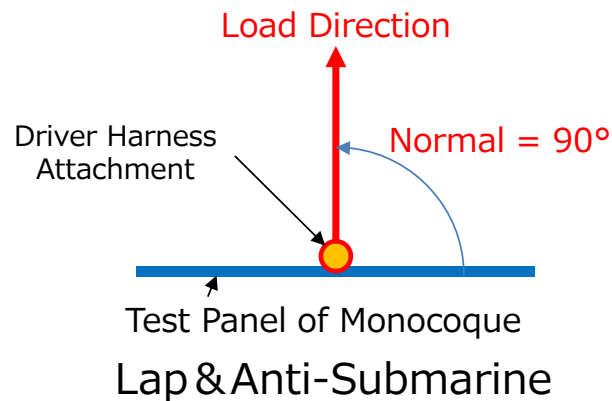
The strength of Lap Belt, Shoulder Belt, and Anti-Submarine Belt attachments must be proven by physical tests where the required load is applied to a representative attachment point where the proposed layup and attachment bracket are used.

- b. Test Load application of the Lap Belt and Anti Submarine Belts must be normal (90 degrees) to the plane of the test sample
- c. Shoulder Belt Test Load application must meet:

Installed Shoulder Belt Angle:	Test Load Application Angle must be:	should be:
Between 90° and 45°	Between 90° and the installed Shoulder Belt Angle	90°
Between 45° and 0°	Between 90° and 45°	90°

The angles are measured from the plane of the Test Sample (90° is normal to the Test Sample and 0° is parallel to the Test Sample)

2023



2023 Rules Revision



F.8.2.3a,c&d AIP Mount method to FBH

a. Welding

- All weld lengths must be greater than 25 mm
- If interrupted, the weld/space ratio must be 1:1 or greater

c. Bonding **New added (for Monocoque FBH)**

- The Front Bulkhead must have no openings
- The entire surface of the Anti Intrusion Plate must be bonded, with shear and peel strength greater than 120 kN

d. Laminating **New added (for Monocoque FBH)**

- The Anti Intrusion Plate must be in front of the outer skin of the Front Bulkhead
- The lamination must fully enclose the Anti Intrusion Plate and have shear capability greater than 120 kN

2023

Bonded & Laminated methods are added

2023 Rules Revision



F.8.2.4 Clearance from Frontal Structure

All Non-Crushable Items inside the Primary Structure must have a minimum 25 mm clearance to the:

- a. Rear face of the Anti Intrusion Plate
- b. All Front Bulkhead structure F.6.1, F.7.2, F.8.4.3
- c. Pedals at full travel and adjustment

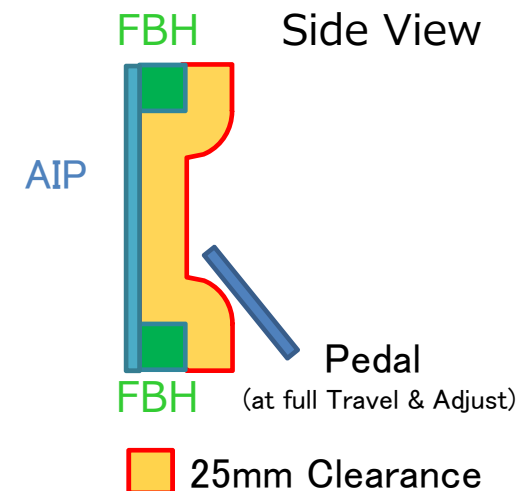
Non-Crushable Items include, but are not limited to batteries, master cylinders, hydraulic reservoirs

2023

Not only the brake pedal, but also the accelerator pedal and clutch pedal must be at least 25mm apart from Rear face of AIP (a) and FBH (b) in the full travel (= until it hits the mechanical stopper) in any adjustable range.

For the protection of the driver's feet, All pedals must have a clearance of 25mm over the entire mechanical range of motion.

Complies with the answer to FSAEJ official Q&A 2023 No.0002



2023 Rules Revision



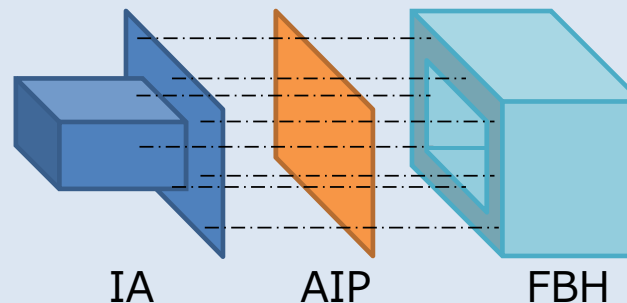
F.8.5.5 Mounting Method IA to AIP

F.8.5.5 When the Impact Attenuator is attached by bolting:

- a. Must have no less than **eight** 8 mm or 5/16" minimum diameter Critical Fasteners, T.8.2
- b. The distance between any two bolt centers must be 50 mm minimum
- c. Each bolt attachment must have pullout, tearout and bending capabilities of 15 kN
- d. **Must be bolted directly to the Primary Structure**

2023

Min. 4 Bolts(2022) ⇒ Min. 8 Bolts
Must be bolted directly to the Primary Structure



2023 Rules Revision

F.8.5.6 Height of IA

The Impact Attenuator must mount so the listed edges are above the lowest point on the top of the Lower Side Impact Structure by the following dimensions:

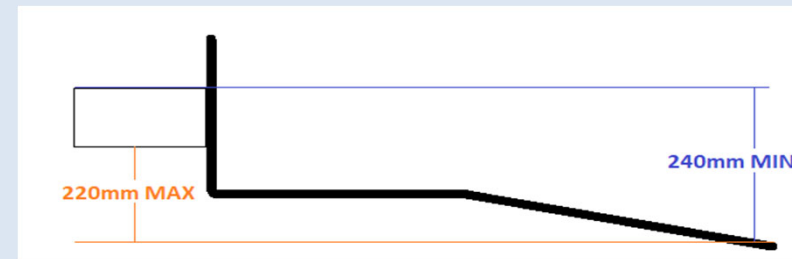
Impact Attenuator Type	Top Leading Edge	Bottom Leading Edge
a. Standard Foam	no limit	220 mm maximum
b. Standard Honeycomb or Custom	240 mm minimum	220 mm maximum

2023

a. STD Form



b. STD Honeycomb or Custom



See illustration of SES

2023 Rules Revision



F.11.2.1b Height of Accumulator Side Impact

Accumulator Container side impact protection must go to a minimum height that is **the lower** of the two:

- The height of the Upper Side Impact Structure
- The top of the Accumulator Container at that point

Revised in 2023Rules ver.2.0
Different from 2023 ver.1.0 !

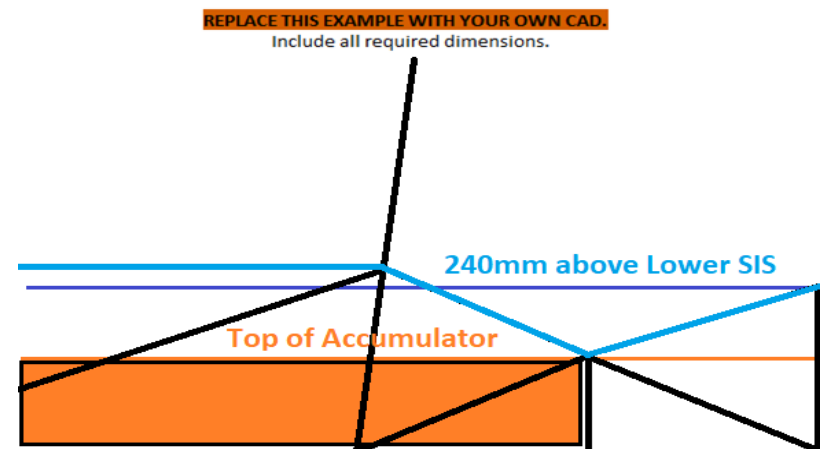
2023 ver.2.0

Min. Height of Accumulator Side protection is

- **Upper SIS** (= 240mm above Lower SIS)
 - **Top of Accumulator Container**
- whichever is lower**

Protection Higher than Upper SIS is NOT needed

See illustration in SES



The triangulated HV protection between the SIS and Rear Impact may be as low as 240mm above the Lower SIS or the top of the accumulator, whichever is lower. There is no maximum height.

Summary of 2023Rules Part. T Changes

Based on Rules 2023 version 2.0 (7.Nov.2022)

2023 Rules Revision



T.1.8.5 Firewall(s)

2022

(EV only) The Accumulator Container may be used as part of the Firewall if it meets these requirements.



2023

(EV only) The Accumulator Container **must not** be part of the Firewall

T.1.9.3 Tractive System Firewalls (EV Only)

2022

Conductive parts other than the Chassis must meet one of:

- Not protrude through the Firewall
- Be properly insulated on the driver side



2023

Conductive parts other than the Chassis and **Brake plumbing (see EV.7.7.1)** must meet one of:

- Not protrude through the Firewall
- Be properly insulated on the driver side of the Firewall

2023 Rules Revision



T.3.1.12 BRAKE SYSTEM

2022

The brake pedal and associated system components design must withstand a minimum force of 2000 N without any failure of the brake system or pedal box.



2023

The brake pedal and associated system components design must withstand a minimum force of 2000 N without any failure of the brake system, pedal box, **chassis mounting, or pedal adjustment**

T.5.5.3 System Sealing

2022

Flammable liquid leaks must not be allowed to accumulate.



2023

Flammable liquid and vapors or other leaks must not collect or **contact the driver**

2023 Rules Revision



T.5.5.4 System Sealing

2022

Two or more holes of minimum diameter 25 mm each must be provided in the lowest part of the structure or belly pan in such a way as to prevent accumulation of liquids and/or vapors.

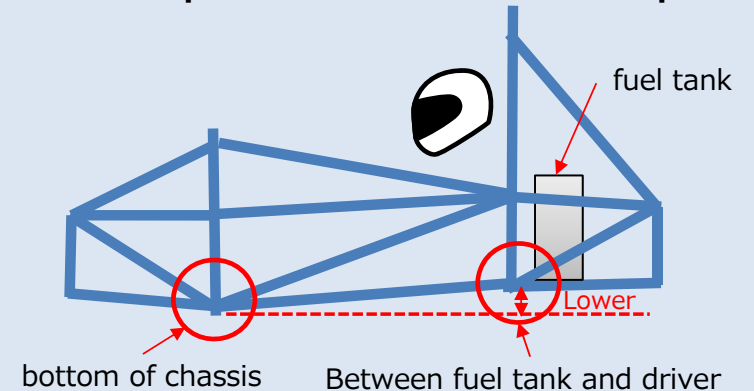


2023

Two holes of minimum diameter 25 mm each must be provided in the structure or belly pan at the locations:

- a. The lowest point of the chassis
- b. Rearward of the driver position, forward of a fuel tank or other liquid source
- c. If the lowest point of the chassis obeys T.5.5.4.b, then only one set of holes T.5.5.4.a is necessary

[An example where two holes are required]



T.6.1.3 PRESSURIZED SYSTEMS New rule

2023

Cylinder Material – gas cylinders/tanks in a position 150 mm or less from an exhaust system must meet one of the two:

- Made from metal
- Meet the thermal protection requirements of T.1.6.3

T.1.6.3

The design must address all three types of heat transfer between the heat source (examples include but are not limited to: exhaust pipe, coolant hose/tube, Accumulator Container) and the panel that the driver could contact (seat or floor):

a. Conduction Isolation by one of the following:

- No direct contact between the heat source and the panel
- A heat resistant, conduction isolation material with a minimum thickness of 8 mm between the heat source and the panel.

b. Convection Isolation by a minimum air gap of 25 mm between the heat source and the panel

c. Radiation Isolation by one of the following:

- A solid metal heat shield with a minimum thickness of 0.4 mm
- Reflective foil or tape when combined with conduction insulation.

2023Rules Part.IC Revision summary

Content is based on Rules 2023 version 2.0 (7.Nov.2022)

2023 Rules Revision



IC.4.8 BSPD

2022

The BSPD must monitor for the following conditions:

- a. Both of the following for more than one second:
 - Hard braking (for example >0.8 g deceleration but without locking the wheels)
 - Throttle greater than 10% open
- b. Loss of signal from the braking sensor(s) for more than 100 msec
- c. Loss of signal from the throttle sensor(s) for more than 100 msec
- d. Removal of power from the BSPD circuit



2023

The BSPD must monitor for the following conditions:

- a. Both of the following for more than one second:
 - Demand for Hard Braking **IC.4.6**
 - Throttle greater than 10% open **IC.4.4**
- b. Loss of signal from the braking sensor(s) for more than 100 msec
- c. Loss of signal from the throttle sensor(s) for more than 100 msec
- d. Removal of power from the BSPD circuit

2023 Rules Revision



IC.5.5.1 Fuel Tank Filling

2022

During fueling or refueling the vehicle may only be touched by the fuel crew and officials.



2023

Fueling / Refueling policies and procedures are at the discretion of the fuel crew and officials.

Complies with Japanese local rules

2023Rules Part.EV Revision summary

Content is based on Rules 2023 version 2.0 (7.Nov.2022)

2023 Rules Revision



EV.7.4.3 Connections

2022

All electrical connections, including bolts, nuts, and other fasteners, in the high current path of the Tractive System must be secured from unintentional loosening by the use of Positive Locking Mechanisms that are suitable for high temperatures. Lock washers and thread locking compounds (Loctite®), DO NOT meet the positive locking requirement. Nyloc nuts do not meet the temperature requirements.



2023

Bolted electrical connections in the high current path of the Tractive System must include a positive locking feature to prevent unintentional loosening. Lock washers or thread locking compounds (Loctite®) or adhesives are **not acceptable**. Bolts with nylon patches are allowed for blind connections into OEM components.



Bolts with nylon patches

2022 Rule compliant Attention point

2022 Rule compliant

F.5.2.3 Bent pipe

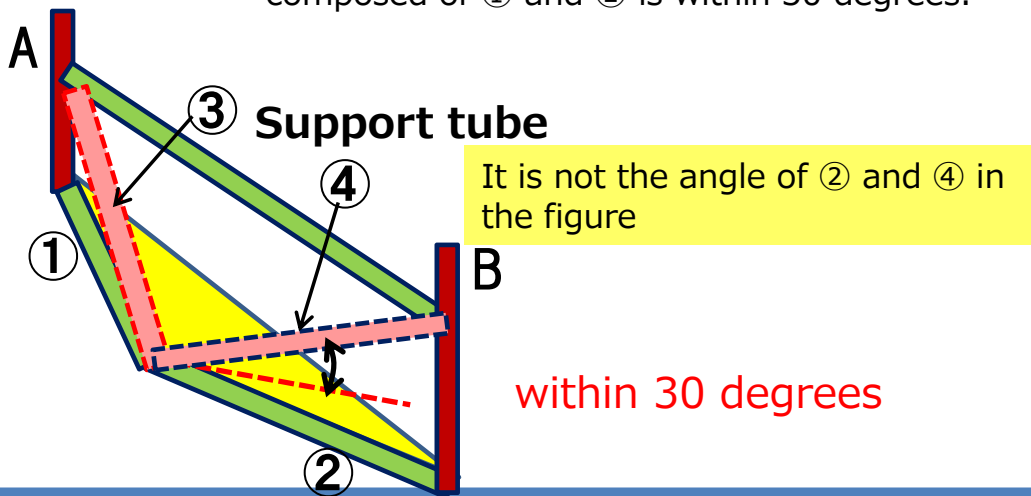
If a curved tube (or a member consisting of multiple tubes that are not aligned) is used anywhere in the primary structure other than a roll hoop, Additional tubes must be installed to support it.

- The attachment point of the support tube should be the furthest point along the curved tube from the straight line connecting the two ends.
- Support tubes must terminate at the nodes of the chassis
- Support tubes for bent tubes (excluding upper side impact members or shoulder harness mounting bars) must meet the following conditions:
 - Same diameter and thickness as the bent tube
 - An angle within 30° from the plane of the bent tube

(Example 1)

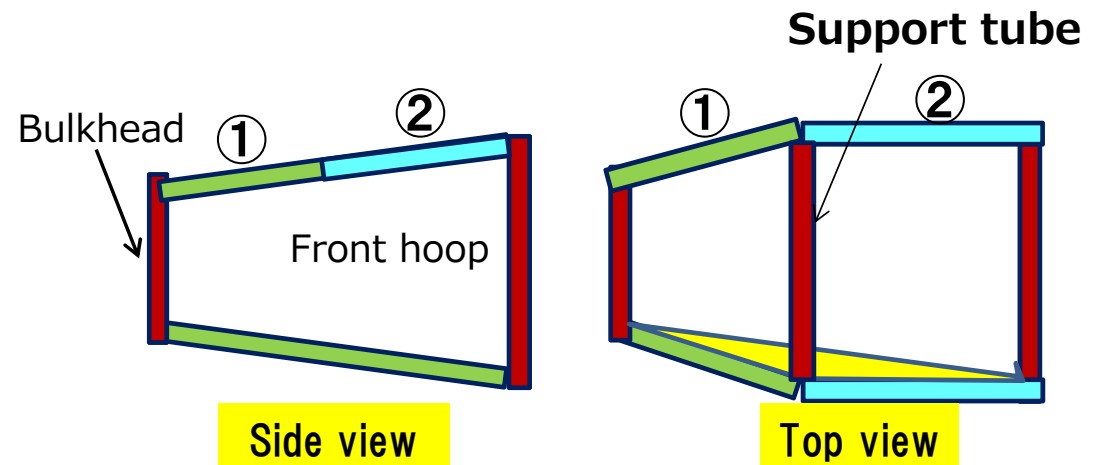
If pipe ①② is bent against pipe A-B, support tube ③ or ④ is required

Additional node angle: Meaning that the angle projected on the yellow plane composed of ① and ② is within 30 degrees.



(Example 2)

Left figure: (1) and (2) are straight lines when viewed from the side
Right figure: Viewed from the top, ① and ② are curved pipes,
The support tube is 0 degrees against the yellow surface. In other words, it is on the same plane as the yellow plane.



2022 Rule compliant



F.5.4.3 primary structure fasteners

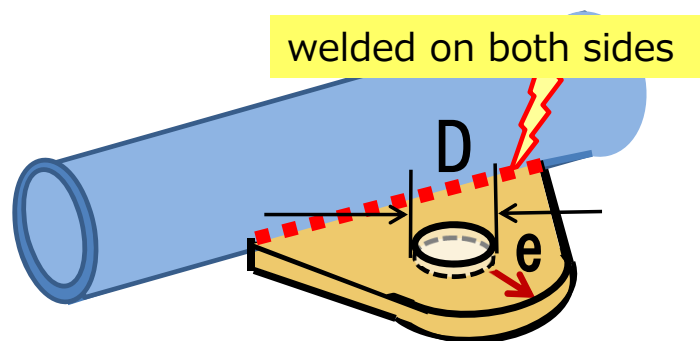
Plates welded directly to the main structure, limited to installation of important safety parts (steering, brakes, driver harness system).

Primary structure bolting using tabs or brackets requires an edge distance ratio " e/D " of 1.5 or greater
" D " is the same as the diameter of the hole.

" e " refers to the edge distance from the edge of the hole to the nearest Tabs attaching suspension members to the primary structure need not meet this requirement

T.2.4.4 Harness mounting

When welding a single shear tab, the base of the tab should be welded on both sides.



" D " = hole diameter

" e " = distance of the free end closest to the end of the bolt hole

Acceptable when $e/D \geq 1.5$

2022 Rule compliant

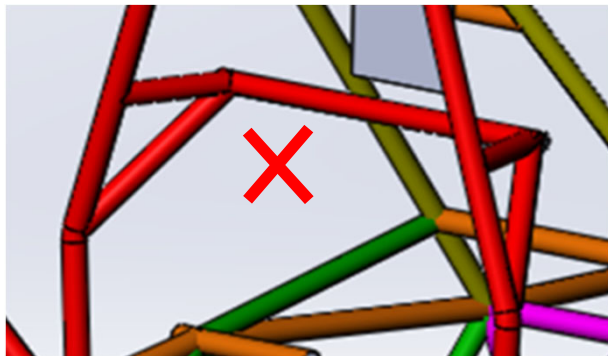


F.6.5 Shoulder harness mount

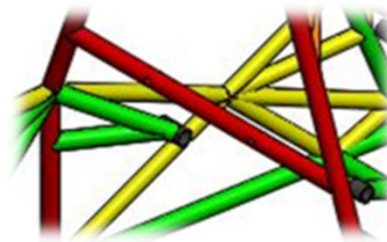
Conforming to F.3.2.1.k be a single piece of uncut continuous closed section steel pipe

The basic shape is a straight pipe welded directly to the main hoop.
A single bent pipe is also permitted, but braces are required (angle of 30 degrees or more when viewed from the side).
In that case, the pipe bending radius should be at least 3 times the pipe diameter. Hooked bent pipes are not permitted. No detachable type with bolts is allowed.

No spliced pipes allowed

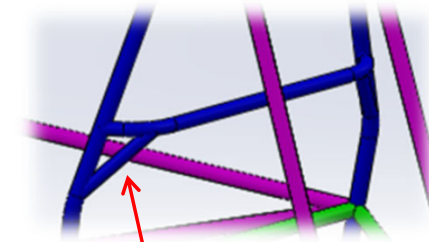


Weld straight pipe directly to MH



OK

1Real bent pipes are OK



Brace required

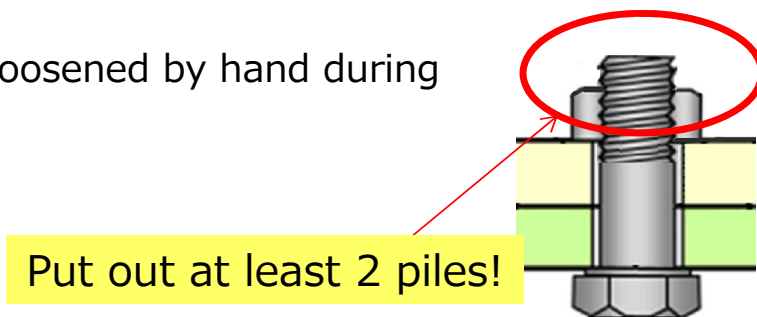
OK

2022 Rule compliant



[General screw fastening parts]

- Driver cell structure, steering, brakes, driver harness, suspension system And the intake manifold attachment and fuel rail attachment are SAE G5 grade and Metrics grade Require 8.8 or higher.
 - There is an example of using a low grade for simple machines
- Ensure a secure locking mechanism that can be seen visually.
 - In some cases, there is a nut between the hub and the upright that cannot be seen
 - Present drawings as evidence
- At least 2 screw protruding threads are required.
 - There is an example where two peaks do not protrude
 - In particular, there are cases where the amount of protrusion is different in the suspension system (Vehicle inspections of unmanaged teams take time)
- Attach double nuts to adjustable tie rods.
 - There is an example of only a single nut, There are cases where it is loosened by hand during vehicle inspection.



2022 Rule compliant



T.2.8 Headrest

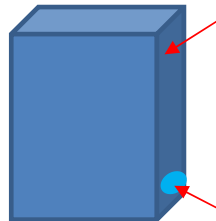
Make sure you are using the following as specified in the 2022 and newer regulations

- Minimum size width 150mm × height 150mm
- Has a height adjustment of 175 mm, or if the height is 280 mm or more, no adjustment mechanism is required.
- Thickness is 38mm or more

Materials must meet one of the following two standards.

- SFI Standard 45.2 (gray)
- CONFOR CF45 (blue) or CF45M (blue) (FIA Technical List No. 17)

CONFOR CF45



Covered with a thin and flexible material T.2.8.6.e
⇒ Hard materials that impair the softness are not allowed.
(Example: Wrapped in cloth packing tape)

- There is an inspection hole of $\phi 20\text{mm}$ or less on the front surface "other than" Being T.2.8.6.e
- It should be a "round hole", but other types are also acceptable. Removable covers are allowed.
- The intention of the rule is to "be able to palpate".

SFI Standard 45.2



The conventionally recognized pink color is "CF42", Not allowed under current rules.



[Reference]

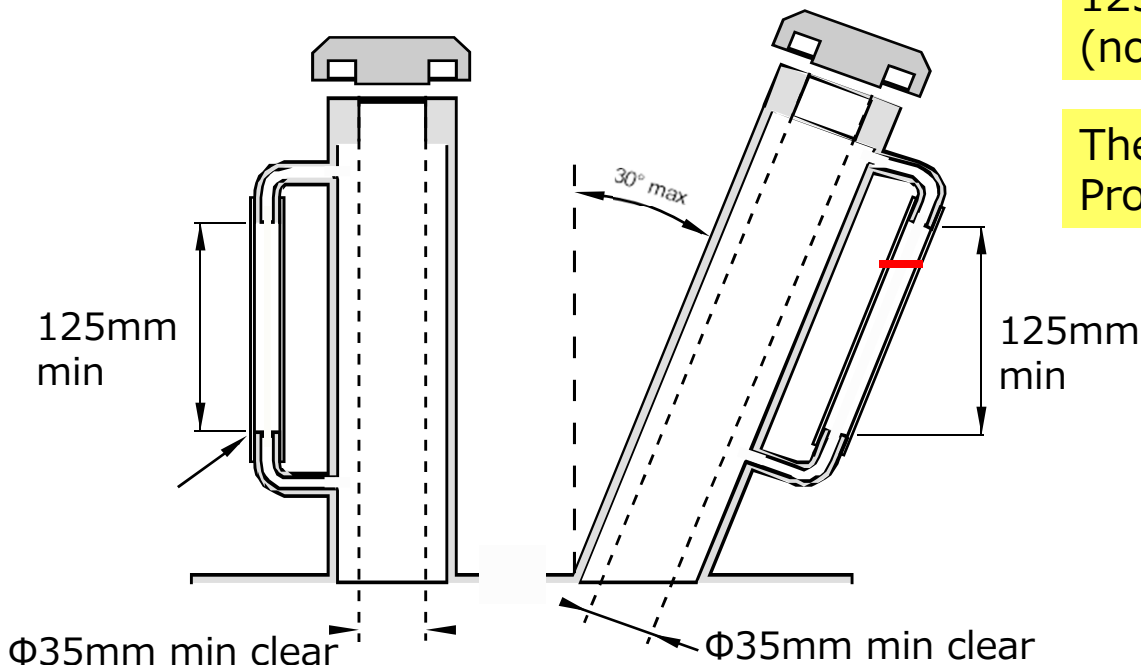
Pink:···Hardness suitable for outside temperatures of 30 degrees or less
Blue:···Hardness suitable for outside temperatures of 30 degrees or higher
Separated by the shock absorber standard above

2022 Rule compliant

IC.5.4 Fuel filler neck & sight tube

All fuel tanks must have a filler neck.

- a: Inside diameter of 35 mm (1.375 inches) or more at any point between the fuel tank and the fuel filler cap
- b: Vertical height is 125 mm (4.9 inches) or more
- c: the angle with the vertical is 30 degrees (30°) or less



125mm is vertical height,
(not the total length of the tube)

The level line is not the top of the L-shaped pipe
Provide 12 to 25 mm above the transparent tube

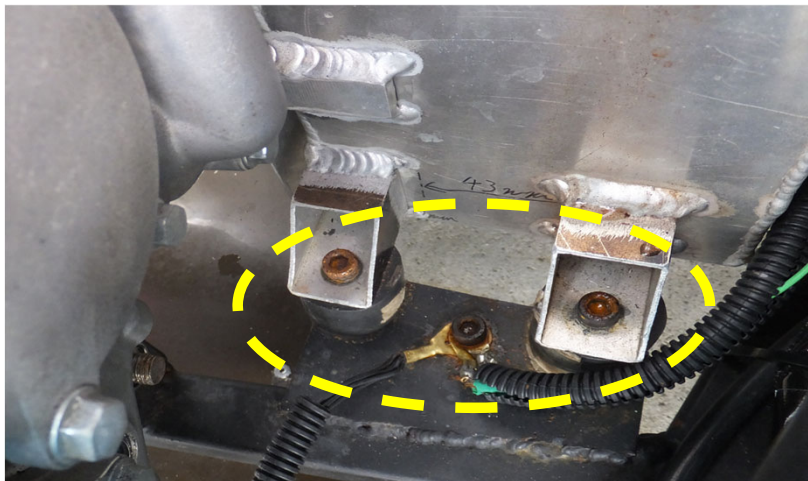
2022 Rule compliant

IC.5.3.1 Fuel tank

Securely attach to the vehicle structure, but be careful not to stress the fuel tank from the chassis flex

To prevent the tank from receiving the load (twisting) of the chassis, provide a margin (such as inserting a rubber bush) in the installation (XY axis).

- Be sure to take measures to reduce the axial torque of the mounting bolts.
If the bracket is fragile, a crack may occur from there, so be careful



2022 Rule compliant

IC.7.2 Exhaust outlet

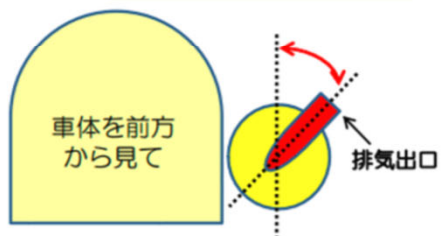
排気出口の向き

排気出口のレイアウトでは下記基準で審査します。

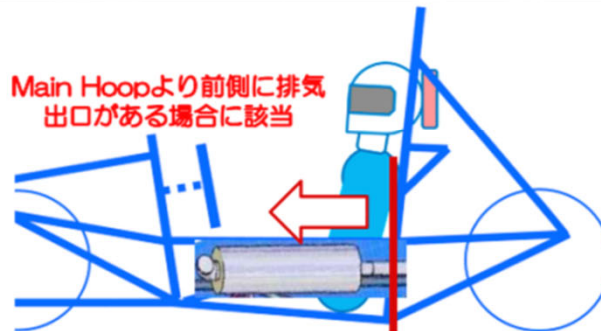
IC.7.2 エキゾーストアウトレット

IC.7.2.1 排気は、どんな走行速度でも、車両の気流を考慮してドライバーが排気煙にさらされないような経路を通るようにしなければならない。

45度以下はNGとする



Main Hoopより前側に排気出口がある場合に該当



Main Hoopより後側に排気出口がある場合は該当しない



写真の様な上向きのレイアウトはNG (厳重な審査対象)

Although it is not stated in the FSAE rules or local rules, the content on the left is determined as an internal rule for the Japan tournament.

background

- Difficulty installing the microphone for measuring the exhaust volume
- Exhaust gas may hit the driver increased and dangerous

2022 Rule compliant

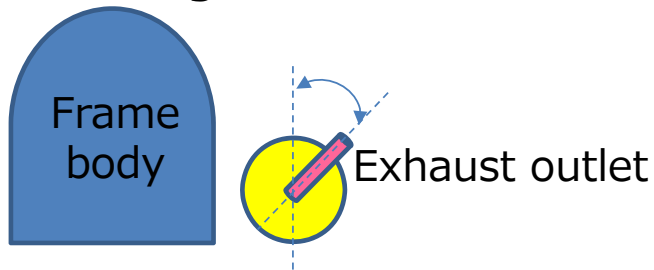
IC.7.2 Exhaust outlet

Exhaust outlet layout will be judged according to the following criteria.

IC.7.2 Exhaust outlet

IC.7.2.1 Exhaust must be routed so that the driver is not exposed to exhaust smoke at any speed, considering the airflow of the vehicle

45 degrees or less is NG

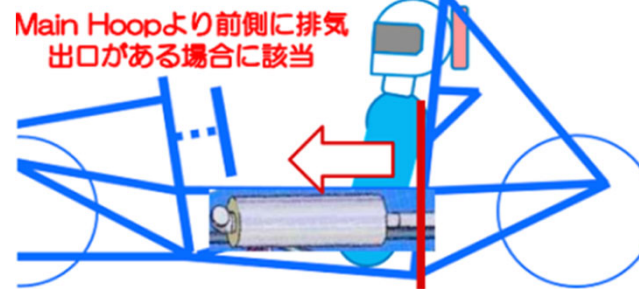


Front view of vehicle body



← The upward layout like the one in the photo is NG.
(Subject to strict screening)

Applicable when there is an exhaust outlet in front of MH



Not applicable if there is an exhaust outlet behind the MH

2022 Rule compliant

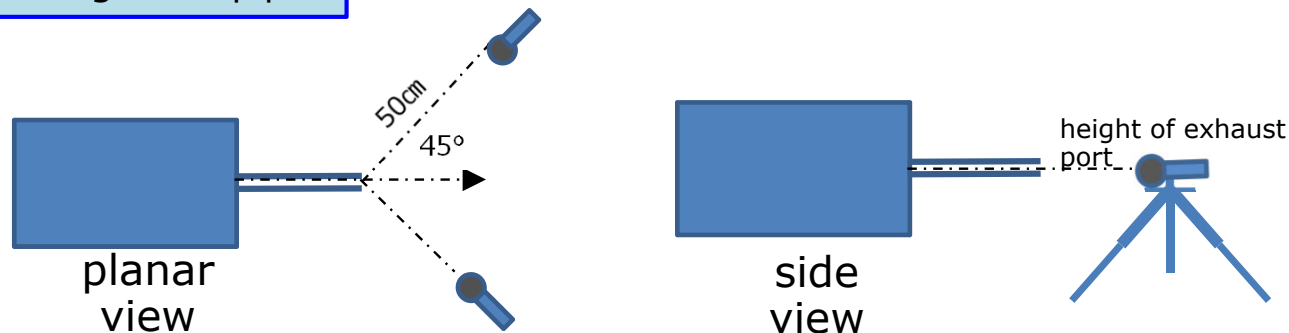
IN.10.1.2 Noise measurement

Measurements are made with a free field microphone placed

- There should be no obstacles
- Measured at the vertical height of the exhaust outlet
- A place 0.5 m away from the end of the exhaust outlet
- Direction of 45 degrees from the horizontal plane of the exhaust outlet

1. Regardless of the angle of the exhaust end face, the center axis is used as the reference, and the horizontal plane of the exhaust outlet is 45 degrees. * See the guide below
2. For upward exits, measure at a position 50 cm above the horizontal plane of the exit. *Possible at any location as there is no horizontal 45 degrees
3. For oblique upper outlets, measure at a position 45 degrees from the horizontal plane of the exhaust outlet.

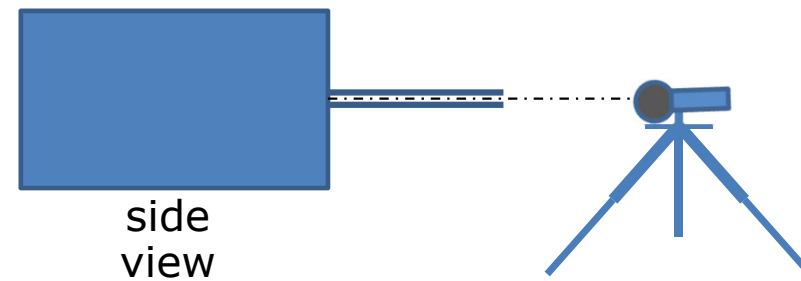
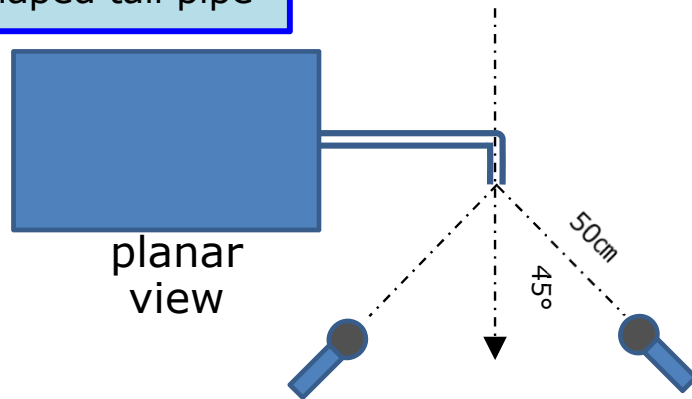
1) Basics: For straight tail pipes



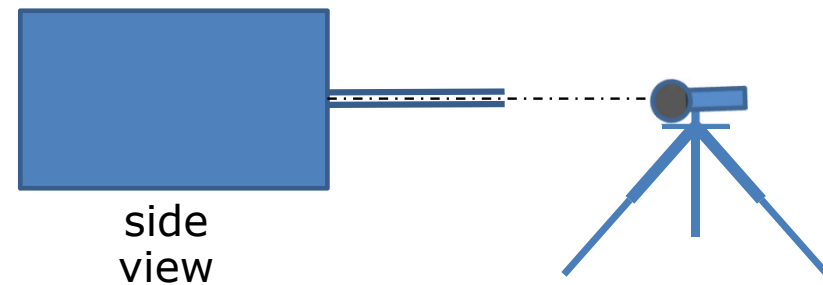
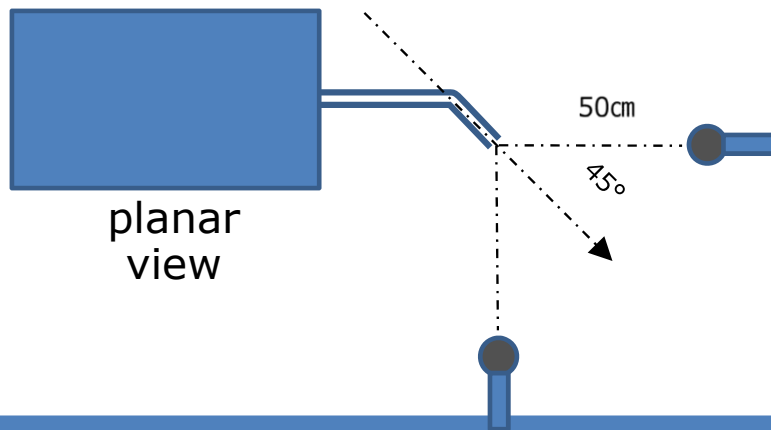
2022 Rule compliant

IN.10.1.2 Noise measurement

2) For L-shaped tail pipe



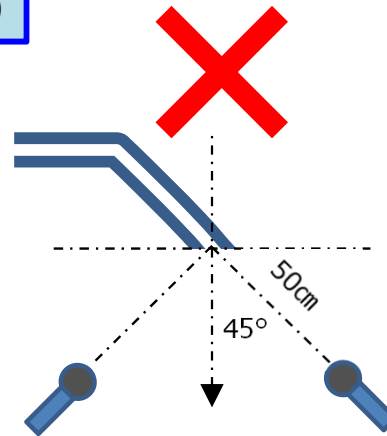
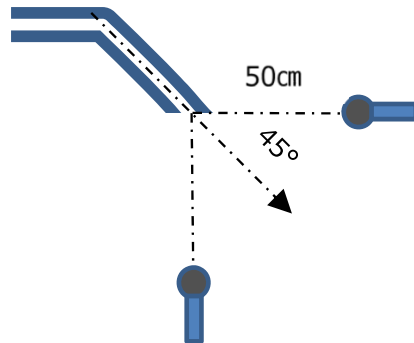
3) For slanted tail pipes



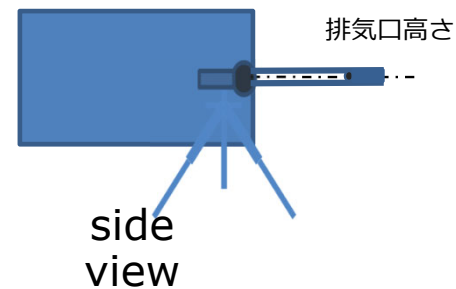
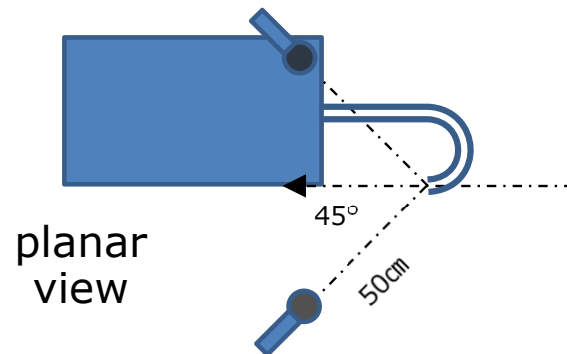
2022 Rule compliant

IN.10.1.2 Noise measurement

3') For slanted tail pipes (end face treatment)



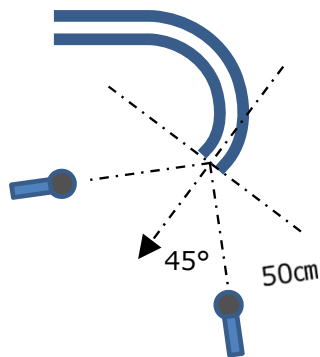
4) For U-shaped tail pipe



2022 Rule compliant

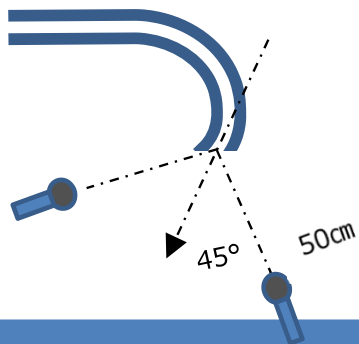
IN.10.1.2 Noise measurement

5) For J-shaped tail pipe

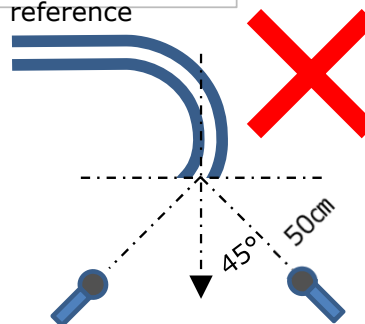


5') For J-shaped tail pipe (end face treatment)

Pipe direction reference



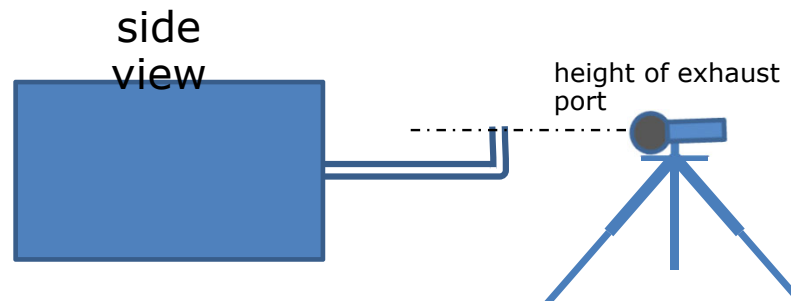
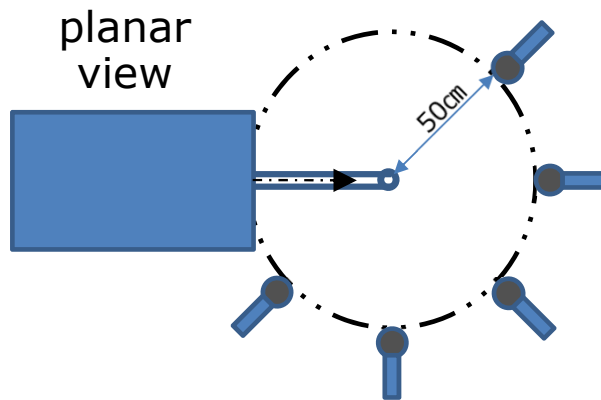
Pipe end face reference



2022 Rule compliant

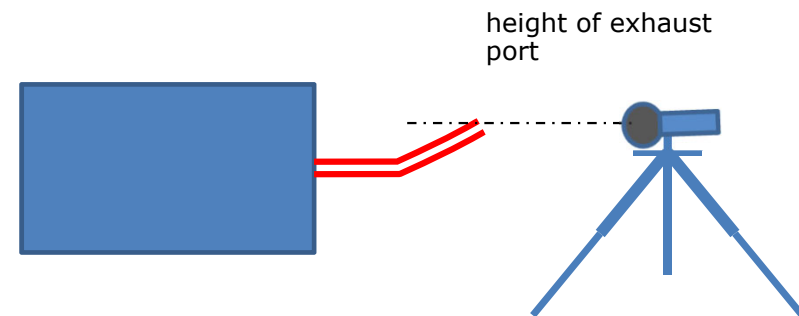
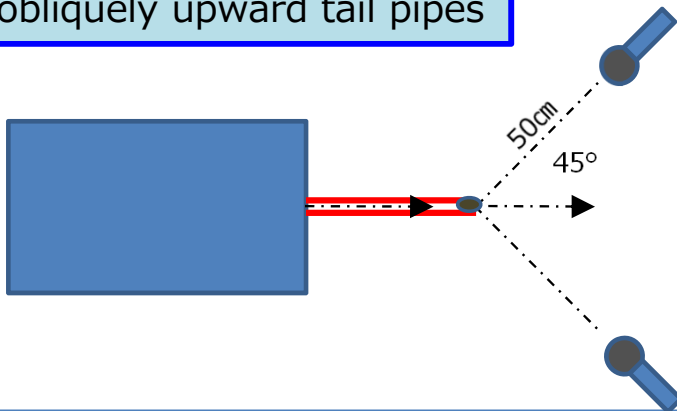
IN.10.1.2 Noise measurement

6) For upward tail pipe



Since the exhaust outlet does not exist in the vertical direction = horizontal direction 45° , only the distance is specified

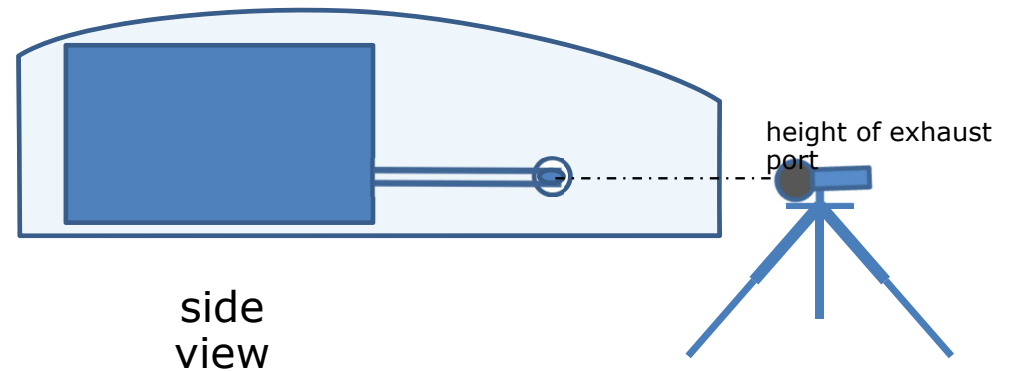
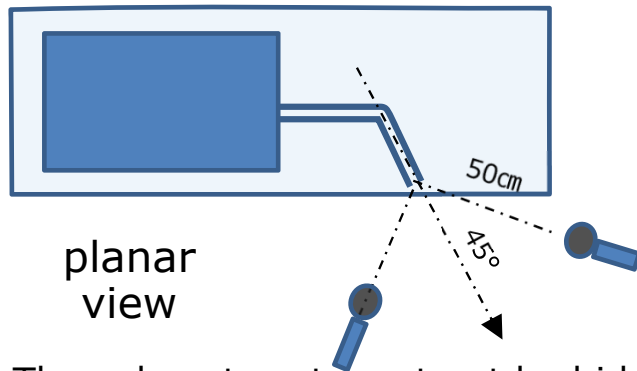
7) For obliquely upward tail pipes



2022 Rule compliant

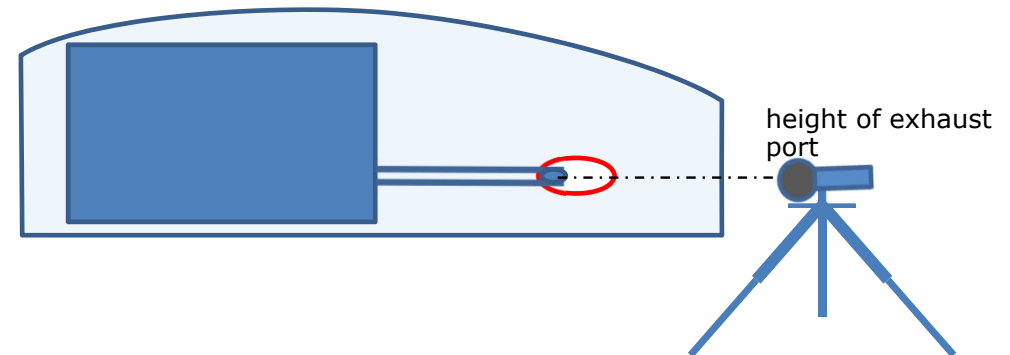
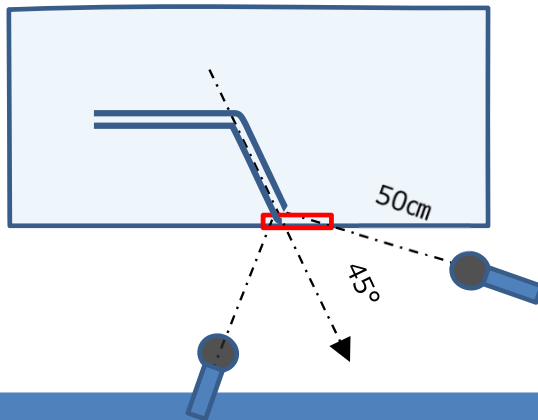
IN.10.1.2 Noise measurement

Reference In the case of exhaust inside the cowl



detail

The exhaust port must not be hidden by the cowl. All of the exhaust ports must be visible from the imaginary 45-degree line without being obstructed by the cowl.
* Roughly the range of "red frame" is necessary for cowl opening



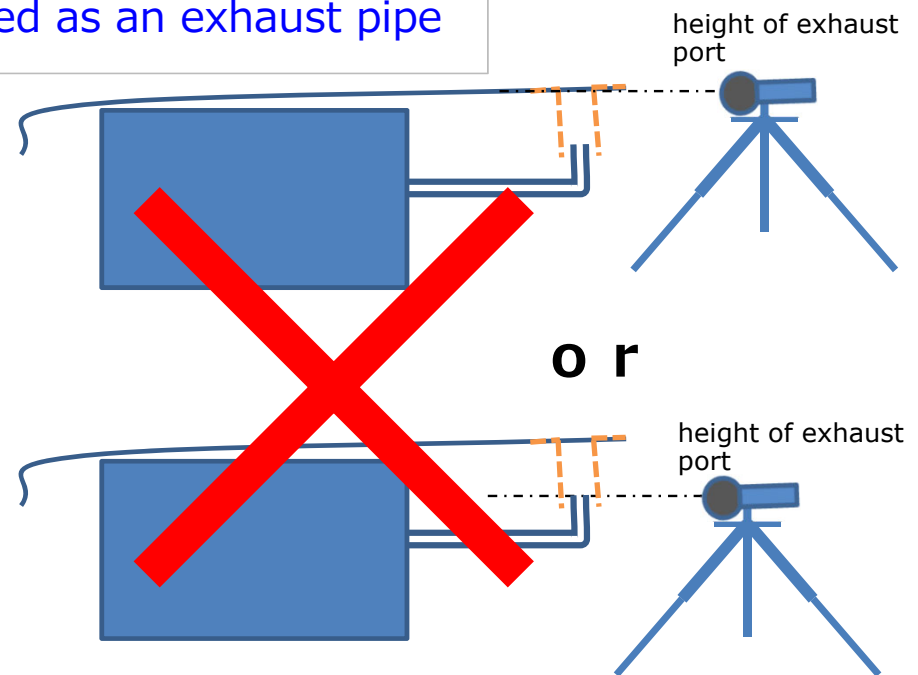
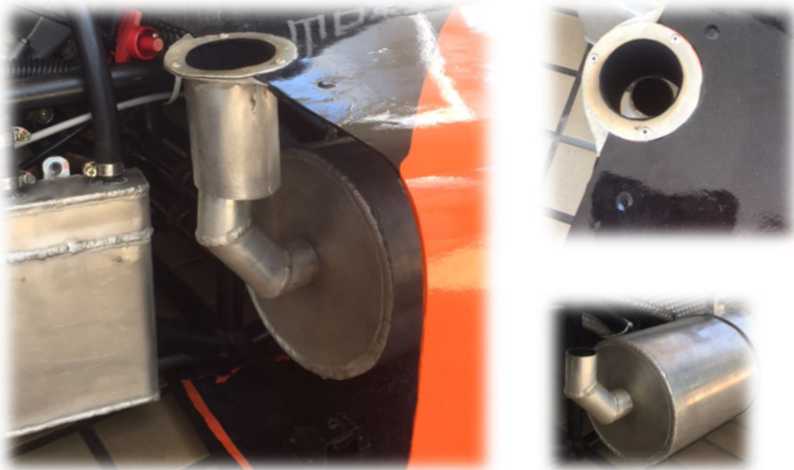
2022 Rule compliant

IN.10.1.2 Noise measurement

Reference In the case of an upward facing tail pipe (cowl extension)

A metal tube is provided on the cowl. A case where the team made a judgment on the "exhaust pipe including the cylinder"

⇒The one manufactured separately is not recognized as an exhaust pipe



Evidence in general

Evidence in general



It is meaningless just to have evidence

[The safe operation of the vehicle is the top priority]
[Responsibility for the vehicle that we made]

Require the presentation of evidence for various vehicle inspection items.

Example 1: If the engine body is to be modified, documentary evidence showing the details of the modification (especially lubrication system including oil pan)

Example 2: Evidence materials showing the heat resistance of catch tanks, etc. (You can't say that last year was OK.)

Example 3: Evidence drawings that show whether parts that cannot be visually inspected are structurally safe and meet the rules

Example 4: Evidence document that the battery satisfies the rules

Example 5: In the case of a carbon monocoque body, evidence photos showing the manufacturing process

Example 6: Evidence drawings that can be presented when requested by a vehicle inspector → Indicates the outer diameter and wall thickness of the frame → Materials showing the details of the IA intrusion prevention plate

Example 7: If it is a purchased product, documentation showing specifications + delivery note, etc.

Positive lock OK example

T.8.3 Positive lock fastener

HARD LOCK NUTS FOR BEARING
ベアリング用ハードロックナット/ファインUナット®

CADデータフォルダ名: 14_Bearings_with_Holder

■ハードロックナット

Type	標準タイプ	薄型タイプ	材質	硬度	表面処理
HLB	—	—	SS400相当	—	パーカー
HLBM	—	—	—	—	無電解ニッケルメッキ
HLBC	HLBU	—	S45C調質	22~28HRC	パーカー
HLBS	—	—	SUS304	—	—

*第2ナット凸部（ボス）の中心とねじの中心には所定のスレが設けてあります。

①薄型タイプ（HLBU）は第2ナット（上ナット）より取り付けてください。

ねじ精度 JIS B0211 6H (2級)

OK

Slotted nut



OK

Since you can't see Photos of the production process, etc. to present evidence



OK

ハードロックナット

雄ナット、雌ナット二つ組で使用

詳細 <http://www.hardlock.co.jp/hl/02.php>

Helicoil



図.1 ヘリコイル全体図

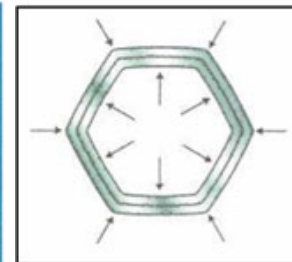


図.2 緩み止め機構

OK

Positive lock OK example



U nut

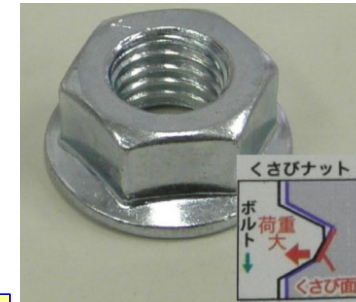
OK

Things that are difficult to distinguish from the outside to present evidence



Super slit nut

OK



Wedge lock nut

OK



Muscle nut

OK

Judgment against the following requirements for locking fasteners

- a. Technical inspectors/team members should be able to verify that the device/system is in place.
- b. Do not rely on clamping force to apply locking or anti-vibration functions. Even if the fastener starts to loosen, the locking device prevents the fastener from loosening completely

Evidence in general

[When important parts are OEM products]

If the intake manifold, fuel rail, and brake (caliper) are OEM products, they are allowed to be fastened with the original bolts, etc., and no additional fastening such as wiring is allowed.

→ Present evidence that proves it is an OEM product

→ Torque management of bolts, etc.



Evidence in general

Battery precautions

Gel-type batteries are considered "non-dry", wet batteries.



Ordinary batteries should not be placed horizontally.
I will only allow what he can present as evidence that "horizontal placement is OK".

*Even if the battery is a shielded battery, it may leak if it is placed horizontally.

T.9.2.2 Overcurrent protection circuit

Overcurrent protection circuit applies to all batteries.

- (1) Confirm that the fuse is directly under the battery.
- (2) Presentation of maximum allowable current value
- (3) Show the fuse characteristics and ask for an explanation that the trip occurs below the maximum allowable current value.

Lithium Ion Battery

- Isolated from the driver compartment by a firewall (T.1.8.1.a)
- Have a solid and robust flame-retardant case (T.9.2.5)

